OCTOBER 15, 1990

CHEMICAL & ENGINEERING

NEWS

Psychoactive Drugs

Chemists seek next-generation agents

Page 33

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CHEMICAL & ENGINEERING NEWS

OCTOBER 15, 1990

News of the Week

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- **Congress continues to work on budget, with impact on R&D still unclear.** **Page 7**
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- **Two U.S. physicians awarded Nobel Prize in Physiology or Medicine for discoveries related to human organ and cell transplants.** **Page 7**
- **NIH opens full-scale investigation into circumstances surrounding AIDS researchers' development of blood test for virus.** **Page 8**
- **Government-approved sales of electronics-related Hercules and Carbide chemical units to the Japanese draw fire during Senate hearing.** **Page 8**

Cover: Colorized magnetic resonance image of the human brain; transaxial slice shows eyes and part of nose. Photo courtesy of General Electric Corporate Research & Development

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Government

Little change in House or Senate rosters is expected as a result of the November elections. **Page 21**

EPA called on to tackle pollution problems that would offer greatest reduction in risk to health and environment. **Page 24**

Education

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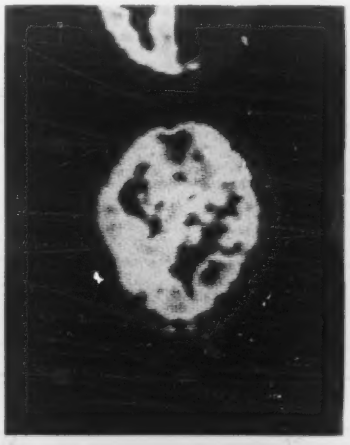
Books

Why bright college students lose interest in pursuing science majors is explored in new book; book of poetry by Roald Hoffmann brings together worlds of science and art. **Page 69**



Product Report

An ever-growing understanding of the molecular biology of the brain is helping chemists in designing the next generation of psychoactive drugs, which likely will be safer and more effective for treating mental illnesses. **Page 33**

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LETTERS

Alternative fuels

The public is gradually being lulled into the belief that gasoline in automobiles can be replaced by an alternative fuel that will radically reduce pollution.

If an alternative fuel is defined as one that will give reasonable performance and economy compared with gasoline, and exists in comparable supply, there isn't any. There have been many excellent articles dealing with alternative fuels, but the authors tend to emphasize the pollution aspects and ignore economics and logistics. One seldom sees any numbers in such articles. The same alternative fuels have been here for 40 years; how many automobiles do you see running on alternative fuel?

David A. Spitz
Columbus, Ohio

Funding for science

I was disturbed after reading the interview with our national science adviser, D. Allan Bromley (C&EN, July 2, page 12). Bromley talks about scientific extravaganzas on page 14; a few pages before, the crisis in biomedical research funding is discussed. What's going on here?

The space station, I understand, will cost on the order of $40 billion to build and another $80 billion to operate, while the Super Collider bill has grown to $8 billion and the human genome project will cost $3 billion. That's not counting the ambitious Moon-Mars project or Mission to Planet Earth.

An underlying assumption is that all these projects are merited. Where is the rigorous review? Is this how we want to allocate our resources now? Could the money be better used for less showy, less ambitious projects? Where is our list of priorities? Do we really want to abandon older projects supporting biomedical research—such as those discussed in the News of the Week article on page 4?

Big science is crowding out the many small federal grants that sustain this country's researchers. Too many big science projects were approved uncritically without concern for their impact on smaller projects that are the seed corn of technical advance.

Bromley was quoted as saying, "A significant amount of excellent science is now not being funded." My question to Bromley is, wouldn't it be more in the national interest to fund Nobel Laureates like Harold Varmus than all the space extravaganzas? I'd like to see you advocate for individual investigators working to make incremental advances in science with the support of federal funding.

Let's not have American policymakers modeling the pharaohs who wasted their nation's resources on showy extravaganzas. Let's build for the future.

Louise Vivona
Research Investigator, Bristol-Myers Squibb Co., Bound Brook, N.J.

After reading the July 2 issue of C&EN, I have found the need to comment on the (seemingly) relentless campaign waged by ACS for increased federal R&D funding, increases in the National Science Foundation budget, and other governmental "assistance" to the scientific community. Any funding by the government must come from the pockets of taxpayers, not some invisible philanthropist. The burden placed upon the taxpayer is far too great at present, and every effort must be made by societies such as ACS to help reduce the present burden rather than increase it for that society's perceived benefit.

Certainly, money is always needed in education, research, and development, as well as thousands of other worthy causes. Does anyone actually believe that an increase in federal funding will serve to enhance the future of science? To expect an extremely partial government—pressured by lobby groups from all sides—to be impartial and purely subjective in the disbursement of funds is too much to ask. Our politicians are too human and subject to the temptations of power and the pressures of their voting public to make these decisions without bias.

So remove the temptation by removing the countless tax-funded programs and allowing industry and private citizens and groups to support their favorite causes freely, without tax consequence. Our country, socially as well as economically, runs best when allowed to run freely, without interference.

Michael J. Verive
Addison, Ill.

Science education

A matter has come to my attention that I wish to pass on to you. This relates to that aspect of your special report on science education (C&EN, June 11, page 27) where there is depicted those in the science personnel pipeline as their educational attainment increases (also shown in years). A plot of the number of people

Polystyrene Heads for Down Year In Face of Market Pressures

Polystyrene output to drop as oil prices push monomer costs up and economic and environmental concerns slow growth in demand

Bruce F. Greek, C&EN Houston

Polystyrene has some problems. Beset by rising monomer costs and low demand growth, it can only be said to be experiencing a slump. Styrene and benzene prices are rising, as crude oil prices shoot up. Demand for polystyrene is slipping for a number of reasons including environmentalists' opposition to single-use packaging, a weakening of the economy, and a falling off of exports as new capacity starts up in other parts of the world.

Several forecasts conclude that 1990 production of polystyrene will decline about 1%, from 5.13 billion lb in 1989 to about 5.05 billion lb this year. The forecasts are contingent upon oil prices remaining doubled as long as the Middle East situation continues and the possibility of a recession exists. If output slips this year, it will make the second straight year of production declines.

A recession next year would, of course, have an impact on production, but no repeat of the 20% decline during the 1982 recession is expected. If crude oil prices fall back to about $20 per barrel, 1991 inventory building could tip production up over the 1990 output.

A small decline in polystyrene output last year and one likely this year will follow a huge growth for the mature product between 1985 and 1988, says William E. Pearson, who heads Partridge Plastics Associates in Midland, Mich. Polystyrene output increased more than 25%, or more than 1.1 billion lb, in three years, which is far above the 2 to 4% growth expected for this plastic. But such growth is not sustainable, and the 1989 output decline of 1.6% was generally anticipated.

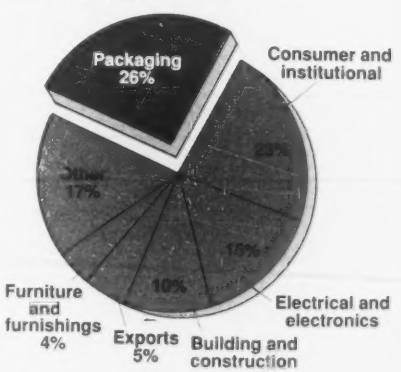
During the first half of this year, polystyrene output declined more than sales and captive use, according to data compiled by Ernst & Young for the Society for the Plastics Industry Committee on Resin Statistics (CRS). This inventory drawdown, which may have extended into the third quarter, likely will cause a rebound in 1991 production. Inventory building could be further spurred by more relatively low-cost styrene becoming available as two large plants go into production.

Problems with styrene availability are partly the cause of an inventory drawdown. In July, an explosion and fire at Arco Chemical's plant near Channelview, Tex., knocked out about 1.4 billion lb of styrene capacity (C&EN, July 16, page 4). Prior to that incident, various Gulf Coast producers of styrene had experienced operating problems stemming from damage caused by an unusually harsh freeze at the end of last year. During the first half of 1990, styrene production was down more than 4% from the first half of 1989, according to estimates of the U.S. International Trade Commission.

Despite lost production, no serious shortages of styrene occurred, says Steve D. Knight who specializes in studies on styrene and its derivatives at Chemical Marketing Associates in Houston. Additional imports and reduced exports of styrene helped to provide supplies. Some small capacity expansions coming on stream during the second quarter also helped meet demand.

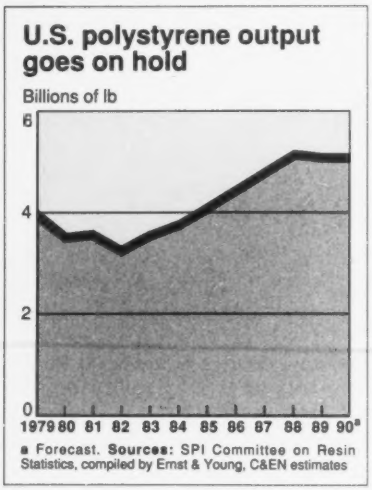
Substantial increases in styrene capacity are coming soon, Knight says. He cites a restart of the Arco Chemical unit and the completion of a Chevron Chemical expansion that combined are expected to have 2.3 billion lb of annual capacity available at the beginning of 1991. Other plant expansions are due later, both in the U.S. and worldwide. Between 1990 and 1997, Knight puts the total of these expansions at 14.3 billion lb, or a 44% increase over the base global capacity of more than 32 billion lb in 1990. These capacity expansions will average 5.7% annually, and are above the expected growth in major uses such as polystyrene. They will make the world styrene market very competitive.

Packaging takes largest share of U.S. polystyrene use



1989 sales and captive use = 5.13 billion lb

Source: SPI Committee on Resin Statistics Annual Major Market Survey


U.S. polystyrene output goes on hold
Billions of lb
6
4
2
0
1979 80 81 82 83 84 85 86 87 88 89 90a
a Forecast. Sources: SPI Committee on Resin Statistics, compiled by Ernst & Young, C&EN estimates

The price of styrene, especially on the spot markets, seesawed during the first half of this year, further affecting polystyrene output and adding to the inventory drawdown. Current prices are rising because of an increase in benzene prices that has been triggered by escalating crude oil prices. Styrene prices have made polystyrene more expensive, especially relative to other thermal plastics that have somewhat similar properties.

In some uses, polystyrene was priced out of its low-end markets, says Pearson. The interpolymer competition came mostly from polypropylene, with only very minor amounts from high-density polyethylene. The shift, however, was so small in most of these uses that details are difficult to determine from available statistics.

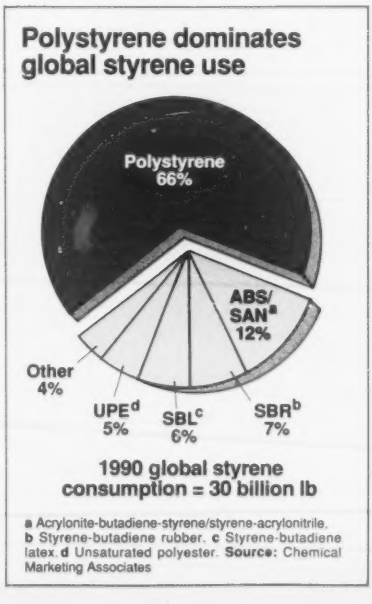
Besides interpolymer competition, polystyrene also has been hit by competition from other materials, particularly paper, according to William C. Kuhlke, who directs studies on plastics as a vice president of DeWitt & Co., Houston. Cost and the more favorable image of being degradable or recyclable have boosted paper into more competition with plastics. However, the effect of paper and other nonplastic materials upon the demand for polystyrene also will be difficult to find in statistics.

Recycling is greatly helping polystyrene as well as other plastics such as polyethylene and thermal plastic polyester, points out Kuhlke. At least four recycling plants designed to handle polystyrene are being built. These should help improve polystyrene's public image, he adds.

As recycling grows later this year and accelerates next year, few concerns likely will develop over the effect on new polystyrene. Kuhlke forecasts that a large part of recycled polystyrene as well as other plastics will be consumed in fabricated products not now made of plastics. Recycled polystyrene's impact on production of new material will be so small that it probably will be lost in statistical error.

Considerations other than polystyrene cost influence decisions about whether another polymer will be substituted in many fabrication processes, says Pearson. Polystyrene has two major advantages. It has easier processibility than any other large-volume thermal plastic, and its maturity means that many plastics fabricators have lengthy experience in forming polystyrene. These considerations often tip the scale toward continued use of polystyrene, even if its cost becomes significantly more than other acceptable plastics for a product.

The cost and processibility factors help polystyrene retain its demand despite the high negative image gained from its use in many kinds of packaging—an image mainly developed from consumers' discarding containers in public areas and from the long life, and therefore long visibility, of such containers.


Polystyrene dominates global styrene use
Polystyrene 66%
ABS/SAN[a] 12%
SBR[b] 7%
SBL[c] 6%
UPE[d] 5%
Other 4%
1990 global styrene consumption = 30 billion lb
a Acrylonite-butadiene-styrene/styrene-acrylonitrile. b Styrene-butadiene rubber. c Styrene-butadiene latex. d Unsaturated polyester. Source: Chemical Marketing Associates

Only two of the major end-use categories compiled by Ernst & Young for CRS for polystyrene have shown a decline through July. Exports are down 14% from the comparable period in 1989, and consumer and institutional products are down 29%. The large decline in consumer and institutional products use could be partly a statistical aberration, Pearson says, because of misclassification. Better analysis of uses could cause reclassification of some of the "all other" category, rendering a better report in this category.

Consumer and institutional products made from polystyrene number in the thousands. For example, some of these products used in hospitals have been replaced by reuseable items. Toys, housewares, and other products made of polystyrene apparently are in less demand as consumers change their interests and lifestyles. The sizable downturn in polystyrene consumption in this category has abated and is expected to recover. Because of increased polystyrene capacity outside the U.S., particularly in the Far East, exports continue to decline as expected (but not so fast as earlier in the year). Styrene capacity in the Far East also is rising rapidly, lowering the monomer cost as well. Polystyrene price increases, which helped interpolymer competition outside the U.S., hastened the decline in exports earlier in the year.

Polystyrene consumption, especially in the U.S., will increase only modestly in the long term, as no important new uses are expected soon. Following the trend of earlier this year, low demand growth will continue to squeeze the margins from selling this plastic, made with high-cost monomer. Relief from any pressure on styrene costs resulting from increased capacity next year remains doubtful unless crude oil prices fall. Rebuilding inventories at various steps between polymer manufacture and consumer product sales could become the major reason for any recovery in production next year. □